

REMARKS

Claims 1-55 were pending. Claims 1, 20, 23, 30, 37, 40, 41, and 54 have been amended. Claims 13, 16-19, 28, 35, and 38-39 have been canceled. Claims 1-12, 14-15, 20-27, 29-34, 36-37, and 40-55 currently are pending.

1. Rejection under 35 U.S.C. § 102(e) based on Okada et al.:

Claims 1, 14-16, 18, 20, 37-39, and 54-55 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. App. Pub. No. 2004/0188838 in the name of Okada et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface” and “a plurality of tape terminal pads on the first tape surface.” The semiconductor module also includes “a semiconductor die having a first die surface,” “an opposite second die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Okada et al. discloses a fingerprint sensor in which the semiconductor die is attached directly to and overlaps the second tape surface (has no tape pad terminals) of the flexible substrate. Thus, Okada et al. does not disclose that an “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.” In addition, Okada et al. teaches sensor packages with die attach pads disposed on multiple side edges of the die. Okada et al. does not teach “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” Okada et al. does not anticipate the invention recited in claim 1. Claim 1 is patentable over Okada et al. Claims 2-12, 14-15, and 20-22 depend from claim 1 and are patentable over Okada et al. for at least the same reasons.

Claim 37 recites a method of forming a semiconductor die package including, *inter alia*, “providing a semiconductor die having a first die surface, a second opposite die surface, a side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method also includes “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface,” “a second opposite tape surface,” and “a plurality of tape terminal pads on the first tape surface.”

Okada et al. discloses a method of making a fingerprint sensor in which a first (die-contact) surface of a die is attached to a second (no-contact) surface of a flexible substrate. Okada et al. does not disclose “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface.” Okada et al. does not anticipate the present invention as recited in claim 37. Claims 40-55 depend from claim 37 and are patentable over Okada et al. for at least the same reasons.

2. Rejection under 35 U.S.C. § 102(e) based on Yamazaki et al.:

Claims 1-2, 5-6, 13, 15-16, 18, 37-38, 42, 45, 47, and 55 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. App. Pub. No. 2003/0201447 in the name of Yamazaki et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module including, *inter alia*, “a dielectric flex tape substrate” and “a semiconductor die” with “a plurality of die attach pads...on the first die surface.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Yamazaki et al. discloses a semiconductor device in which die are disposed on a substrate to which flexible tape connector 909 (FIG. 9B) is attached. Yamazaki et al. does not disclose that the “opposite second die surface of the semiconductor die” is “attached directly to and overlapping the first tape surface of the tape substrate.” Claim 1 is patentable over Yamazaki et al. Claims 2-12, 14-15, and 20-22 depend from claim 1 and are patentable over Yamazaki et al. for at least the same reasons.

Claim 37 recites a semiconductor die package forming method that includes “providing a semiconductor die having a first die surface, a second opposite die surface, a side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method further includes “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface, a second opposite tape surface, a plurality of tape terminal pads on the first tape surface,” and “forming electrical connections between the die attach pads adjacent the side edge of the die and respective tape terminal pads on the first tape surface of the tape substrate.”

Yamazaki et al. discloses a semiconductor device formed by disposing several die on a substrate to which flexible tape connector 909 is attached. Flexible tape connector 909 (FIG. 9B) is attached to a first substrate surface on which the semiconductor die are disposed. Yamazaki et al. does not disclose “providing a semiconductor die having a first die surface,” “an opposite second die surface,” and “a plurality of die attach pads...on the first die surface,” and “attaching to the second opposite die surface a dielectric flex tape substrate.” Claim 37 is patentable over Yamazaki et al. Claims 40-55 depend from claim 37 and are patentable over Yamazaki et al. for at least the same reasons.

3. Rejection under 35 U.S.C. § 102(e) based on Yamada et al.:

Claims 1-4, 6-7, 9-12, 14-16, 19, 21-24, 29, 37-44, 47-48, and 51¹-55 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 6,768,516 to Yamada et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface” and “a plurality of tape terminal pads on the first tape surface.” The semiconductor module also includes “a semiconductor die having a first die surface,” “an opposite second die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.”

¹ A clerical error in paragraph 4 of the Detailed Action omitted claim 51 from the list of rejected claims.

Yamada et al. discloses an image processor disposed on a flexible substrate with wire bonds 38, 39 attached from all side edges of image processor to the flexible substrate. Yamada et al. does not disclose or suggest “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” Claim 1 is patentable over Yamada et al. Claims 2-12, 14-15 and 20-22 depend from claim 1 and are patentable over Yamada et al. for at least the same reasons.

Claim 23 recites a camera module, including, *inter alia*, “a dielectric flex tape substrate having a first tape surface,” and “a semiconductor die having a pixel array.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Yamada et al. discloses image processor die 9 attached directly to flexible substrate 5. As shown in FIG. 10 of Yamada et al., for example, imaging semiconductor 4 with the pixel array is not attached to the flexible substrate. Thus, Yamada et al. does not disclose or suggest a camera module having a “semiconductor die having a pixel array” and an “opposite second die surface...attached directly to and overlapping the first tape surface of the tape substrate.” Claim 23 is patentable over Yamada et al. Claims 24-29 depend from claim 23 and are patentable over Yamada et al. for at least the same reasons.

Claim 37 recites forming a semiconductor die package by, *inter alia*, “providing a semiconductor die having a first die surface, a second opposite die surface, a side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method also includes “forming electrical connections between the die attach pads adjacent the side edge of the die and respective tape terminal pads on the first tape surface of the tape substrate.”

Yamada et al. discloses an image processor disposed on a flexible substrate and attached with wire bonds 38, 39 from all sides of the image processor to the flexible substrate. Yamada et al. does not disclose or suggest “providing a semiconductor die having a plurality of die attach pads disposed only on the first die surface adjacent the side

edge” and “forming electrical connections between the die attach pads adjacent the side edge of the die and respective tape terminal pads on the first tape surface of the tape substrate.” Claim 37 is patentable over Yamada et al. Claims 40-55 depend from claim 37 and are patentable over Yamada et al. for at least the same reasons.

4. Rejection under 35 U.S.C. § 102(b) based on Kimba et al.:

Claims 1-4, 6, 8-12, 15, 23-24, 26, 30-31, 33, 37-38, 42-44, 46-47, 49-53, and 55 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Pat. No. 6,528,778 to Kimba et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface” and “a plurality of tape terminal pads on the first tape surface.” The semiconductor module also includes “a semiconductor die having a first die surface,” “an opposite second die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Kimba et al. discloses semiconductor devices in which sensor chips have die attach pads disposed around multiple side edges. Kimba et al. does not teach “a semiconductor die having a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” Kimba et al. also does not disclose that “the opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.” Claim 1 is not anticipated by Kimba et al. Claims 2-12, 14-15, and 20-22 depend from claim 1 and so are patentable for at least the same reasons.

Claim 23 recites a camera module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface,” “an opposite second tape surface,” and “a plurality of tape terminal pads on the first tape surface.” The camera module also includes “a

semiconductor die having a pixel array, a first die surface, an opposite second die surface, a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Kimba et al. discloses semiconductor devices in which sensor chips have die attach pads disposed around multiple side edges. Kimba et al. does not teach a camera module that includes “a semiconductor die” having “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” In addition, Kimba et al. discloses that conductive bumps on the first die surface attach to a first tape surface of flexible substrate 23. Kimba et al. does not disclose or suggest that the “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.” Claim 23 is not anticipated by Kimba et al. Claims 24-29 depend from claim 23 and so are patentable over Kimba et al. for at least the same reasons.

Claim 30 recites an imaging apparatus including, *inter alia*, “a processor” and “a camera module electrically connected to the processor.” The camera module includes “a semiconductor die having a pixel array, a first die surface,” “a die attach end,” and “a plurality of die attach pads on the first die surface adjacent the die attach end.” The “opposite second die surface of the semiconductor die” is “attached directly to and overlapping the first tape surface of the tape substrate.”

Kimba et al. discloses die attach pads surrounding a sensor die. Kimba et al. does not teach a camera module which has “a plurality of die attach pads on the first die surface adjacent the die attach end.” In addition, Kimba et al. discloses semiconductor die bump-bonded to flexible substrates in a face-to-face orientation: Kimba et al. does not disclose that the “opposite second die surface of the semiconductor die” is “attached directly to and overlapping the first tape surface of the tape substrate.” Claim 30 is patentable over Kimba et al. Claims 31-36 depend from claim 30 and so are patentable over Kimba et al. for at least the same reasons.

Claim 37 recites a method of forming a semiconductor die package including, *inter alia*, “providing a semiconductor die having a first die surface, a second opposite die surface, a side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method also includes “attaching to the second opposite die surface a dielectric tape substrate.”

Die attach pads disclosed by Kimba et al. are located on all sides of the sensor chip. Further, Kimba et al. uses semiconductor chips bump-bonded to flexible substrates. Kimba et al. does not teach or suggest a method that includes “attaching to the second opposite die surface a dielectric flex tape substrate.” Claim 37 is patentable over Kimba et al. Claims 40-55 depend from claim 37 and are patentable for at least the same reasons.

5. Rejection under 35 U.S.C. § 102(c) based on Takiar et al.:

Claims 1-5, 12-13, 15-17, 23, 25-26, 28, 30, 32-33, 35, 37-39, 42-45, 53, and 55 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,384,397 to Takiar et al. Applicant respectfully requests reconsideration of this rejection.

Claim 1 recites a semiconductor module comprising, *inter alia*, “a dielectric flex tape substrate having a first tape surface” and “a plurality of tape terminal pads on the first tape surface.” The module includes “a semiconductor die having a first die surface, an opposite second die surface, a side edge” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Takiar et al. discloses a module for a lens housing assembly that includes a sensor package 32. The sensor package 32 is bump-bonded face-to-face on a substrate. Takiar et al. does not disclose a semiconductor die with an “opposite second die surface...attached directly to and overlapping the first tape surface of the tape substrate.” Takiar et al. does

not anticipate the invention recited in claim 1. Claims 2-12, 14-15, and 20-22 depend from claim 1 and are patentable over Takiar et al. for at least the same reasons.

Claim 23 recites a camera module including, *inter alia*, “a semiconductor die having a pixel array, a first die surface, a second die surface, a side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface.”

Takiar et al. does not teach a sensor package having the “opposite second die surface” attached “directly to and overlapping the first tape surface.” Claim 23 is patentable over Takiar et al. Claims 24-29 depend from claim 23 and are patentable over Takiar et al. for at least the same reasons.

Claim 30 recites an imaging apparatus including, *inter alia*, an imaging apparatus with “a processor” and “a camera module electrically connected to the processor.” The imaging apparatus also includes “a dielectric flex tape substrate having a first tape surface” and “a plurality of tape terminal pads on the first tape surface.” A semiconductor die has “a pixel array, a first die surface, an opposite second die surface, a die attach end, and a plurality of die attach pads on the first die surface adjacent the die attach end.” The “opposite second die surface” of the semiconductor die is “attached directly to and overlapping the first tape surface of the tape substrate.”

Takiar et al. does not teach a semiconductor die that has “a plurality of die attach pads on the first die surface adjacent the die attach end” in which the “opposite second die surface” of the semiconductor die is “attached directly to and overlapping the first tape surface of the tape substrate.” Instead, as shown in FIG. 9, for example, Takiar et al. discloses that the first tape surface is attached directly to the first die surface. Takiar et al. does not anticipate or render obvious the invention recited in claim 30. Claims 31-36 depend from claim 30 and so are patentable over Takiar et al. at all for at least the same reasons.

Claim 37 recites a method of forming a semiconductor die package that includes “providing a semiconductor die having a first die surface,” “a second opposite die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method further includes “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface,” with “a plurality of tape terminal pads on the first tape surface.”

The module disclosed by Takiar et al. is not assembled in the same manner as that recited in claim 37. Instead, referring again to FIG. 9 of Takiar et al., the “first tape surface” of the flexible substrate is attached to the “first die surface” with the “die attach pads” disposed “adjacent the side edge.” Claim 37 is patentable over Takiar et al. Claims 40-55 depend from claim 37 and so are patentable over Takiar et al. for at least the same reasons.

6. Rejection under 35 U.S.C. § 103(a) based on Yamada et al.:

Claims 5, 25, 30-32, 36, and 45 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamada et al. Reconsideration of this rejection respectfully is requested.

Claim 5 depends from claim 1 which is patentable over Yamada et al. Yamada et al. has not been cited under 35 U.S.C. § 103(a) against claim 1. In any event, Yamada et al. does not contain any suggestion or motivation as would be necessary to modify its disclosure to provide the missing feature, for example, of “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” Claim 1, and its dependent claims including 5, are patentable over the reference to Yamada et al.

Claim 25 depends from claim 23, which is patentable over Yamada et al. Yamada et al. has not been cited under 35 U.S.C. § 103(a) against claim 23. In any event, Yamada et al. does not contain any suggestion or motivation necessary to modify its disclosure to provide the missing feature, for example, of a camera module having a

“semiconductor die having a pixel array” and an “opposite second die surface...attached directly to and overlapping the first tape surface of the tape substrate.” Claim 23 and its dependent claims including claim 25 are patentable over the reference to Yamada et al.

Claim 30 recites an imaging apparatus including, *inter alia*, “a processor” and “a camera module electrically connected to the processor.” The camera module includes “a semiconductor die having a pixel array,” “a first die surface,” “a die attach end,” and “a plurality of die attach pads on the first die surface adjacent the die attach end.” The “opposite second die surface of the semiconductor die” is “attached directly to and overlapping the first tape surface of the tape substrate.”

The Office Action asserts that Yamada et al. discloses the device as claimed. Applicant respectfully disagrees: As noted above, imaging semiconductor 4 with the pixel array is not attached to the flexible substrate. Thus, Yamada et al. does not disclose or suggest a camera module having a “semiconductor die having a pixel array” and an “opposite second die surface...attached directly to and overlapping the first tape surface of the tape substrate.” Claim 30 is patentable over Yamada et al. Claims 24-29 depend from claim 23 and are patentable over Yamada et al. for at least the same reasons.

Claim 45 depends from claim 37 which is patentable over Yamada et al. Yamada et al. has not been cited under 35 U.S.C. § 103(a) against claim 37. In any event, the cited prior art does not contain any suggestion or motivation necessary to modify the Yamada et al. disclosure to provide the missing feature, for example, of “providing a semiconductor die having a plurality of die attach pads disposed only on the first die surface adjacent the side edge” and “forming electrical connections between the die attach pads adjacent the side edge of the die and respective tape terminal pads on the first tape surface of the tape substrate.” Claim 37 is patentable over Yamada et al. Claims 40-55 depend from claim 37 and are patentable over Yamada et al. for at least the same reasons.

7. Rejection under 35 U.S.C. § 103(a) based on Takiar et al.:

Claims 6, 8-11, 24, 31, 47, and 49-52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takiar et al. Reconsideration of this rejection respectfully is requested.

Claims 6 and 8-11 depend from claim 1, which is patentable over Takiar et al. Takiar et al. has not been cited under 35 U.S.C. § 103(a) against claim 1. In any event, Takiar et al. does not contain any suggestion or motivation as would be necessary to modify its disclosure and provide the missing feature, for example, of “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” Claim 1, and its dependent claims including 6 and 8-11, are patentable over the reference to Takiar et al.

Claim 24 depends from claim 23, which is patentable over Takiar et al. Takiar et al. has not been cited under 35 U.S.C. § 103(a) against claim 23. In any event, Takiar et al. does not contain any suggestion or motivation as would be required to modify its disclosure and provide the missing feature, for example, of a camera module having a “semiconductor die having a pixel array” and an “opposite second die surface...attached directly to and overlapping the first tape surface of the tape substrate.” Claim 23 and its dependent claims including claim 24 are patentable over the reference to Takiar et al.

Claim 31 depends from claim 30 which is patentable over Takiar et al. Takiar et al. has not been cited against claim 30 under 35 U.S.C. § 103(a). In any event, Takiar et al. does not contain any suggestion or motivation to provide “a plurality of die attach pads on the first die surface adjacent the die attach end” and an “opposite second die surface of the semiconductor die...attached directly to and overlapping the first tape surface of the tape substrate.” Claim 30 is patentable over Takiar et al. Claims 31-36 depend from claim 30 and are patentable over Takiar et al. for at least the same reasons.

Claim 47 depends from claim 37 which is patentable over Takiar et al. Takiar et al. has not been cited under 35 U.S.C. § 103(a) against claim 37. In any event, Takiar et al. does not contain the suggestion or motivation necessary to modify its disclosure to provide a method of making a module in which the "first tape surface" of the flexible substrate is attached to the "first die surface" with the "die attach pads" disposed "adjacent the side edge." Claim 37 is patentable over Takiar et al. Claims 40-55 depend from claim 37 and so are patentable over Takiar et al. for at least the same reasons.

8. Rejection under 35 U.S.C. § 103(a) based on Tamura et al.:

Claims 1, 21-22, 37, and 40-41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. App. Pub. No. 2004/0027477 in the name of Tamura et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module comprising "a dielectric flex tape substrate having a first tape surface," "an opposite second tape surface," and "a plurality of tape terminal pads on the first tape surface." A semiconductor die has "a first die surface," "an opposite second die surface," "a side edge," and "a plurality of die attach pads disposed only on the first die surface adjacent the side edge." The "opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate."

Tamura et al. discloses a CCD chip that is bump-bonded to flexible substrate 11. Tamura et al. does not disclose a device in which, for example, the "opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate." Claim 1 is patentable over Tamura et al. Claims 2-12, 13-14, and 20-22 depend from claim 1 and are patentable over Tamura et al. for at least the same reasons

Claim 37 recites a method of forming a semiconductor die package by "providing a semiconductor die having a first die surface, a second opposite die surface, a

side edge, and a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The method further includes “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface,” “a second opposite tape surface,” and “a plurality of tape terminal pads on the first tape surface.”

Tamura et al. discloses a camera module with an imaging device 15 mounted by bump-bonding on flexible sheet 11. Tamura et al. does not disclose forming an imaging device by, for example, “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface.” Claim 37 is patentable over Tamura et al. Claims 40-55 depend from claim 37 and so are patentable over Tamura et al. for at least the same reasons.

9. Rejection under 35 U.S.C. § 102(e) or 103(a) based on Kim et al.:

Claims 1-7, 9-12, 21-27, 29-34, 36-37, 40-48, and 50-53² stand rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent Application Publication 2003/0223008 to Kim et al. Reconsideration of this rejection respectfully is requested.

Claim 1 recites a semiconductor module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface,” “an opposite second tape surface,” and “a plurality of tape terminal pads on the first tape surface.” A semiconductor die has “a first die surface,” “an opposite second die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The semiconductor die is “attached directly to the opposite second die surface and overlapping the first tape surface of the tape substrate.”

Kim et al. discloses an image sensor module in which an image sensor 12 is attached to a substrate 11, which in turn is attached to a flexible tape substrate 16. Kim et

² A listing of the rejected claims was omitted from the first paragraph of section 10 on page 21 of the Detailed Action.

al. does not teach or suggest, for example, a semiconductor die that is “attached directly to the opposite second die surface and overlapping the first tape surface of the tape substrate.” The Office Action attempts to establish *prima facie* obviousness with the unsupported claim that the flex tape substrate 26 and substrate 21 are “functionally equivalent.” Applicant respectfully disagrees, and in any event points out that claim 1 recites that the semiconductor die is “attached directly to...the tape substrate.” Further, the modification suggested by the Office Action would improperly render inoperable the device disclosed by Kim et al. in requiring removal of substrate 21 from the structure shown in FIG. 4, for example. Since additional camera structure is supported on substrate 21, Kim et al. contains no suggestion or motivation for, but rather teaches away from, elimination of support substrate 21. Withdrawal of this rejection respectfully is requested. If the rejection is maintained, applicant requests evidence of the purported functional equivalence of the substrates.

Claim 23 recites a camera module including, *inter alia*, “a dielectric flex tape substrate having a first tape surface,” “an opposite second tape surface,” and “a plurality of tape terminal pads on the first tape surface.” A semiconductor die has “a pixel array,” “a first die surface,” “a second die surface,” “a side edge,” and “a plurality of die attach pads disposed only on the first die surface adjacent the side edge.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Kim et al. discloses an imager mounted to a solid substrate 21. Substrate 21 is attached to a flexible tape substrate 26. Kim et al. does not teach or suggest, for example, that “the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.” Further, since other camera components are supported on solid substrate 21, Kim et al. can not be modified to eliminate the solid substrate 21 and attach “the semiconductor die...directly to the tape substrate.” Claim 23 is patentable over Kim et al. Claims 24-29 depend from claim 23, and so are patentable over Kim et al. for at least the same reasons.

Claim 30 recites an imaging apparatus including, *inter alia*, “a processor” and “a camera module electrically connected to the processor.” The camera module includes “a dielectric flex tape substrate having a first tape surface,” “an opposite second tape surface,” and “a plurality of tape terminal pads on the first tape surface.” A semiconductor die has “a pixel array,” “a first die surface,” “an opposite second die surface,” “a die attach end,” and “a plurality of die attach pads on the first die surface adjacent the die attach end.” The “opposite second die surface of the semiconductor die is attached directly to and overlapping the first tape surface of the tape substrate.”

Kim et al. discloses an imager chip mounted to a substrate 21. A flexible tape substrate 26 is attached to substrate 21. Kim et al. does not teach or suggest that “the semiconductor die is attached directly to...the tape substrate.” As noted above, the Office Action fails to establish *prima facie* obviousness of removing substrate 21 from the device structure disclosed by Kim et al. Claim 30 is patentable over Kim et al. Claims 31-36 depend from claim 30 and so are patentable over Kim et al. for at least the same reasons.

Claim 37 recites a method of forming a semiconductor die package. The method includes, *inter alia*, “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface.”

The image sensor module disclosed by Kim et al. features an image sensor attached to a substrate that supports other components of the image sensor module. The support substrate is attached to tape substrate 26. Kim et al. does not teach or suggest a method of forming a semiconductor die package by, for example, “attaching to the second opposite die surface a dielectric flex tape substrate having a first tape surface.” Claim 37 is patentable over Kim et al. Claims 40-55 depend from claim 37, and so are patentable over Kim et al. for at least the same reasons.

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In view of the above amendment, applicant believes the pending application is in condition for allowance.

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